

NATURAL RESOURCES CONSERVATION SERVICE CONSERVATION PRACTICE STANDARD

FILTER STRIP

(Ac.)

CODE 393

DEFINITION

A strip or area of herbaceous vegetation situated between cropland, grazingland, or disturbed land (including forestland) and environmentally sensitive areas.

PURPOSE

- To reduce sediment, particulate organics, and sediment adsorbed contaminant loadings in runoff.
- To reduce dissolved contaminant loadings in runoff.
- To serve as Zone 3 of a Riparian Forest Buffer, Practice Standard 391.
- To reduce sediment, particulate organics, and sediment adsorbed contaminant loadings in surface irrigation tailwater.
- To restore, create or enhance herbaceous habitat for wildlife and beneficial insects.
- To maintain or enhance watershed functions and values.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies: 1) in areas situated below cropland, grazing land, forest land, or disturbed land; 2) where sediment, particulate organic matter and/or dissolved contaminants may leave these areas and enter environmentally sensitive areas; 3) in areas where permanent vegetative establishment is needed to enhance wildlife and beneficial insects, or maintain or enhance watershed function.

This practice does not apply to components of a planned agricultural

waste management system, the treatment of runoff from such areas as feedlots, barnyards, and other livestock holding areas; or effluent and diluted silage leachate. Refer to WV conservation practice standard (635) Wastewater Treatment Strip.

This practice should not be used alone to address resource concerns associated with logging operations. Refer to Field Office Technical Guide reference BMP's for Controlling Soil Erosion and Sediment from Logging Operations in WV.

CRITERIA

General Criteria Applicable to All Purposes

Filter strips shall be designated as vegetated areas to treat runoff and are not part of the adjacent cropland rotation.

Overland flow entering the filter strip shall be primarily sheet flow. Concentrated flow shall be dispersed.

If present, noxious weeds shall be controlled within the filter strip.

Filter strip establishment shall comply with local, state and federal regulations.

Pesticide application within a field may require a specific filter flow length as indicated on product labels or state regulations. These requirements for filter flow length will always be used if greater than the minimum criteria in this standard.

Frequent vehicular traffic shall be excluded from the filter strip and shall not be utilized as access areas, roadways or travel lanes.

**NRCS, NHCP
October 2003**

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

**NRCS, WV
July 2005**

Only viable, high quality and regionally adapted seed will be used to plant filter strips.

Where appropriate, fences or other exclusionary measures may be necessary. Refer to WV Conservation Practice Standard Use Exclusion (472).

Filter strip flow length shall be determined based on:

- 1. field and filter strip percent slope and slope length;**
- 2. the predicted erosion rate;**
- 3. the amount and particle size distribution of sediment delivered to the filter strip;**
- 4. the density and height of the filter strip vegetation;**
- 5. and the runoff volume associated with erosion producing events.**

The minimum flow length for this purpose shall be 20 feet.

The filter strip location requirements are as follows:

a) The filter strip shall be located along the downslope edge of a field or disturbed area. To the extent practical, it shall be established on the contour. Variation in placement on the contour should not exceed a 0.5 percent longitudinal (perpendicular to the flow length) gradient.

b) The immediate drainage area above the filter strip shall have greater than 1 percent but less than a 10 percent slope.

c) The ratio of the drainage area to the filter strip area shall be less than 60 to 1.

d) The average annual sheet and rill erosion rate above the filter strip shall be less than 6 tons per acre per year.

The filter strip shall be established to permanent herbaceous vegetation consisting of a single species or a mixture of grasses, legumes, and/or other forbs adapted to the soil, climate, nutrients, chemicals, and cultural practices used in

the current management system. Species selected shall have stiff stems and a high stem density near the ground surface. Stem density shall be such that the stem spacing does not exceed 1 inch.

Vigorous vegetative cover with adequate stem density will be established and/or maintained. Permanent herbaceous cover shall be established using the seeding recommendations, seedbed and site preparation methods outlined in the WV conservation practice standard Critical Area Planting (342) or Pasture and Hayland Planting (512).

Table 1 below lists species that may be utilized in addition to those listed in Critical Area Planting (342).

SPECIES/MIX ^{1/}	RATE (lbs/ac) PLS	Drainage
Eastern gamagrass	10	Well – Moderately Well
switchgrass	10	Well – Somewhat Poorly
switchgrass	3	Well – Moderately Well
big bluestem	4	
Indiangrass	2	
Eastern gamagrass	3	
little bluestem	3	
costal panicgrass	2	Well – Somewhat Poorly
big bluestem	2	
Indiangrass	2	
little bluestem	3	
sideoats grama	2	
switchgrass	2	Well – Moderately Well
big bluestem	1	
little bluestem	3	
Indiangrass	3	Well – Moderately Well
switchgrass	4	
big bluestem	2	
Indiangrass	2	

Table 1. Warm season grass mixtures for use in filter strips.

^{1/} Use stratified seed and inoculate all legumes. Warm season grasses should be planted April 1 – May 15. Some species may require special seeding techniques and equipment.

Additional Criteria to Reduce Dissolved Contaminants in Runoff

Filter strip flow length required to reduce dissolved contaminants in runoff shall be based on management objectives, contaminants of concern, and the volume of runoff from the filter strip's drainage area

compared with the filter strip's area and infiltration capacity.

The minimum flow length for this purpose shall be 30 feet plus the primary flow length of 20 feet.

Additional Criteria to Serve as Zone 3 of a Riparian Forest Buffer, Practice Code 391

Except for the location requirements, the **General Criteria** also apply to this purpose.

If concentrated flows entering Zone 3 are greater than the filter strip's ability to disperse them, other means of dispersal, such as spreading devices, must be incorporated.

Additional Criteria to Restore, Create or Enhance Herbaceous Habitat for Wildlife and Beneficial Insects

This purpose is intended to be used in combination with one or more of the previous purposes and should not be utilized as a primary single purpose. The minimum criteria for the primary purpose(s) must be met initially.

Additional filter strip flow length devoted to this purpose must be added to the flow length required for the other purpose(s). The minimum additional flow length shall be 30 feet.

Any addition to the flow length for wildlife or beneficial insects may be added to the downhill slope of the filter strip.

Vegetation to enhance wildlife habitat may be added to that portion of the filter strip devoted to other purposes to the extent this vegetation does not detract from the primary functions.

Plant species selected for this purpose shall be permanent vegetation adapted to the targeted wildlife or beneficial insect populations. Refer to the WV Wildlife Habitat Evaluation Technique (WVWHET) for herbaceous species that benefit certain wildlife species or as recommended by state staff specialists.

Density of the vegetative stand established for this purpose shall consider targeted wildlife habitat requirements and

encourage plant diversity. Dispersed woody vegetation may be used to the extent it does not interfere with herbaceous vegetative growth the primary purpose or the operation and maintenance of the filter strip.

The filter strip shall not be harvested during the nesting season for avian species from March 15 to July 15.

Additional Criteria to Maintain or Enhance Watershed Functions and Values

Plant species selected for this purpose shall be for establishment of permanent vegetation.

Filter strips shall be strategically located to maximize the connectivity of corridors and non-cultivated patches of vegetation to facilitate dispersal and movement of wildlife and species populations.

Filter strips shall be strategically located to enhance aesthetics of the watershed.

The minimum flow length for this purpose shall be 20 feet.

CONSIDERATIONS

Consider the type and density of vegetation and how it influences filter effectiveness.

Stem diameter (inches)	Number of stems (stems per square foot)
0.10	50
0.25	25
0.50	12
0.75	8
1.00	5

Table 2. Recommended stem densities of vegetation for filter strips.

Filter strips should be strategically located to reduce runoff, and increase infiltration and ground water recharge throughout the watershed.

Filter strips for the purpose of wildlife/beneficial insect habitat or to enhance watershed function should be strategically located to intercept contaminants thereby enhancing air and water quality.

To avoid damage to the filter strip consider using vegetation that is somewhat tolerant to herbicides used in the up-slope crop rotation.

Increasing the width of the filter strip will increase the potential for capturing particulates.

Consider using this practice to enhance the conservation of declining species of wildlife, including those that are threatened or endangered.

Consider using this practice to protect National Register listed or eligible (significant) archaeological and traditional cultural properties from potential damaging contaminants.

Filter strip size should be adjusted to accommodate harvest and maintenance equipment.

Consider the use of this practice to sequester more carbon. Increasing the width of filter strip will increase the potential for carbon sequestration.

Consider the amount of time to establish some species of vegetation. In some instances this may be as long as 3 years (i.e. warm season grasses).

Consider the effectiveness of the filter strips outside of the growing season and determine the need for additional conservation practices.

The design width should consider the soils permeability to ensure satisfactory performance.

Hydrologic soil groups (A, B, C, and D) are indicative of the infiltration and runoff potential. Soil groups A and B have higher infiltration potential; therefore, less runoff than groups C and D. Soil drainage class also determines the extent of soil moisture conditions and water storage available in a soil. Filter strips located on hydrologic soil groups C and D are less effective than filter areas on A and B soils. Refer to the local soil survey for information regarding the hydrologic soil group for a particular soil.

Consider the use of filter strips in conjunction with other practices such as

Contour Farming (330) and Contour Buffer Strips (332).

PLANS AND SPECIFICATIONS

A plan includes information about the location, construction sequence, vegetation establishment, and management and maintenance requirements.

Specifications for applying this practice shall be prepared for each site and recorded using approved specification sheets, job sheets, technical notes, and narrative statements in the conservation plan, or other acceptable documentation.

At a minimum, specifications shall include (as applicable):

- ***Length, width, and slope of the filter strip and the contributing area to accomplish the planned purpose (width refers to flow length across the filter strip).***
- ***Species and seeding rates***
- ***Planting dates, methods, care, and handling of seed.***
- ***Site preparation sufficient to establish and grow selected species***
- ***WV CPA-052 or similar environmental documentation***
- ***Operation and maintenance requirements***

OPERATION AND MAINTENANCE

For the purposes of filtering contaminants, permanent filter strip vegetative plantings should be harvested as appropriate to encourage dense growth, maintain an upright growth habit and remove nutrients and other contaminants that are contained in the plant tissue.

Control weeds or undesirable plants within the filter strip.

Inspect the filter strip after storm events and repair any gullies that have formed, remove unevenly deposited sediment accumulation that will disrupt sheet flow, reseed disturbed

areas and take other measures to prevent concentrated flow through the filter strip.

Apply supplemental nutrients according to soil test to maintain the desired species composition and stand density of the filter strip.

To maintain or restore the filter strip's function, periodically regrade the filter strip area when sediment deposition at the filter strip-field interface jeopardizes its function, and then reestablish the filter strip vegetation, if needed. If wildlife habitat is a purpose, destruction of vegetation within the portion of the strip devoted to that purpose should be minimized by regrading only to the extent needed to remove sediment and fill concentrated flow areas.

Avoid maintenance activities during the primary nesting season (March 15- July 15). If mowing is necessary to maintain the filter strip, mow between July 15 and August 15. Exceptions may be granted for filter strip renovation and repair.

Grazing shall not be permitted in the filter strip unless a controlled grazing system is being implemented. Grazing will be permitted under a controlled grazing system only when soil conditions support livestock traffic without excessive compaction. ***Refer to practices such as Prescribed Grazing (528) or Forage Harvest Management (511) for relevant information including a grazing schedule specifying timing and intensity.***

REFERENCES

National Employee Development Center (NEDC) Conservation Buffers Participant Handbook, Fort Worth, TX. February 2005

USDA Natural Resources Conservation Service, CORE-4 Handbook, Chapter 3e, Filter Strip. 2004.

**** Bold italics indicate changes made or information added to the national standard by West Virginia.***